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審査請求　未請求　請求項の数2　OL　（全 4 頁）

(54)【発明の名称】　電気測定器の波形判定方法

(57)【要約】

【課題】　被測定信号のレベル変動に関係なく、インパルスや高調波の重畳などによる本来求めるべき異常波形のみを検出する。

【解決手段】　被測定信号を所定の時間間隔でサンプリングするA／D変換器と、そのディジタル信号により種々の演算を行ない被測定信号の測定値を求める測定制御手段とを含み、測定制御手段は、あらかじめ取り込まれた基準波形の少なくとも1周期分について、その各サンプリングごとに所定幅の判定エリア（許容最大値および許容最小値）を設定し、被測定信号の各サンプリングデータと判定エリアとを比較して所定の判定を行なう電気測定器の波形判定方法において、基準波形のレベル値Aと被測定信号のレベル値Bとの比率に応じて、判定エリアの幅を変更する。

8/1/2007, EAST Version: 2.0.3.0

1
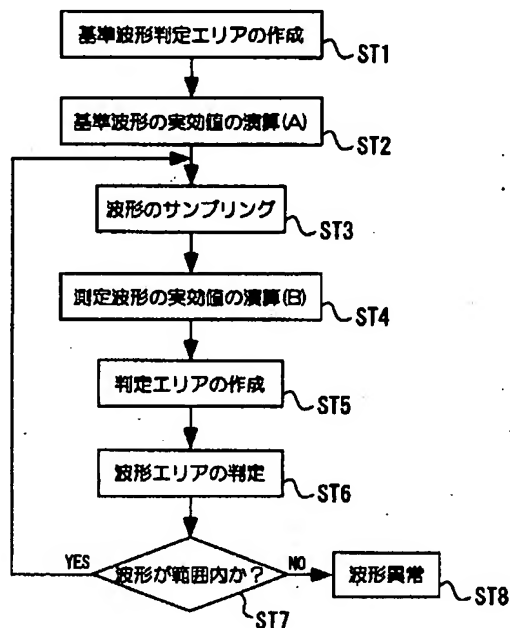
【特許請求の範囲】

【請求項１】　被測定信号を所定の時間間隔でサンプリングするＡ／Ｄ変換器と、そのディジタル信号により種々の演算を行ない上記被測定信号の測定値を求める測定制御手段とを含み、上記測定制御手段は、あらかじめ取り込まれた基準波形の少なくとも１周期分について、その各サンプリングごとに所定幅の判定エリア（許容最大値および許容最小値）を設定し、上記被測定信号の各サンプリングデータと上記判定エリアとを比較して所定の判定を行なう電気測定器の波形判定方法において、

上記測定制御手段は、上記基準波形から上記判定エリアを設定する際に、上記基準波形のレベル値Ａを演算してメモリに格納し、上記被測定信号の測定にあたっては、その１周期ごとに同被測定信号のレベル値Ｂを演算により求めるとともに、同レベル値Ｂと上記レベル値Ａとの比率に応じて上記判定エリアの幅を変更し、この変更された判定エリアにより上記被測定信号の波形判定を行なうことを特徴とする電気測定器の波形判定方法。

【請求項２】　当該電気測定器が電力計であり、上記レベル値Ａ，Ｂがともに実効値である請求項１に記載の電気測定器の波形判定方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は電気測定器の波形判定方法に関し、さらに詳しく言えば、被測定信号のレベル変動には応答せず、もっぱら高調波などの重畳に起因する突発現象などを検出し得るようにした波形判定方法に関するものである。

【０００２】

【従来の技術】例えば、電圧波形を長時間にわたって観測するような場合、いつの時点で異常が発生したかなどの解析を容易にするため、従来においては、図５に示されているように、波形判定の基準となる基準電圧波形Ｖｒｅｆから、その判定のための上限値Ｕと下限値Ｌとを設定し、これを判定エリアとして被測定電圧を監視するようにしている。

【０００３】この判定エリアは、例えば測定レンジの±５％幅もしくは基準電圧波形Ｖｒｅｆの±５Ｖ幅などとして適宜設定されるが、いずれにしても基準電圧波形Ｖｒｅｆの１周期分について、その各サンプリングポイントごとに上限値Ｕと下限値Ｌとが例えばマイクロコンピュータ（略称、マイコン）のメモリに記憶される。

【０００４】測定に際して、マイコンはメモリから上限値Ｕと下限値Ｌとを読み出し、そのコンパレータ機能により、被測定電圧波形に判定エリアの範囲外の部分があるかどうかを監視し、図６に例示されているように、被測定電圧波形Ｖに判定エリア範囲外の部分がある場合には、ＮＧ（異常）と判定する。

【０００５】

【発明が解決しようとする課題】これによれば、被測定

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電圧波形Ｖにインパルス的なノイズや高調波の重畳などにより図６のようなヒゲ状の突発波形が現れた場合はもとより、図７に示されているように、レベル変動により被測定電圧波形Ｖの一部が判定エリア範囲外となった場合にもＮＧ判定とされてしまう。

【０００６】商用電源の場合、被測定電圧波形Ｖのレベル変動は時間帯の影響を強く受ける。一例として、スーパーストアやコンビニエンスストアなどにおいて、全体的に電力消費が少ない例えば夜間などでは１００Ｖ付近で安定しているが、冷暖房設備や食品冷凍設備それに照明設備などの各設備のフル可動時には電圧が９７〜９８Ｖ付近にまで落ちることがある。

【０００７】このようなレベル変動がある波形を監視し、インパルスや高調波の重畳などにより本当に波形の形が崩れた場合のみを異常として検出したい場合があるが、上記従来技術ではレベル変動をも検出してしまうため、本来検出すべき異常波形現象を取りこぼしてしまうことがあった。

【０００８】

【課題を解決するための手段】本発明は、このような課題を解決するためになされたもので、その目的は、波形のレベル変動に関係なく、インパルスや高調波の重畳などによる波形異常のみを検出できるようにした電気測定器の波形判定方法を提供することにある。

【０００９】上記目的を達成するため、本発明は、被測定信号を所定の時間間隔でサンプリングするＡ／Ｄ変換器と、そのディジタル信号により種々の演算を行ない上記被測定信号の測定値を求める測定制御手段とを含み、上記測定制御手段は、あらかじめ取り込まれた基準波形の少なくとも１周期分について、その各サンプリングごとに所定幅の判定エリア（許容最大値および許容最小値）を設定し、上記被測定信号の各サンプリングデータと上記判定エリアとを比較して所定の判定を行なう電気測定器の波形判定方法において、上記測定制御手段は、上記基準波形から上記判定エリアを設定する際に、上記基準波形のレベル値Ａを演算してメモリに格納し、上記被測定信号の測定にあたっては、その１周期ごとに同被測定信号のレベル値Ｂを演算により求めるとともに、同レベル値Ｂと上記レベル値Ａとの比率に応じて上記判定エリアの幅を変更し、この変更された判定エリアにより上記被測定信号の波形判定を行なうことを特徴としている。

【００１０】このように、本発明によれば、基準波形のレベル値Ａと被測定信号のレベル値Ｂとの比率により、判定エリアの幅が変更されるため、被測定信号のレベル変動に関係なく、本来求めるべき異常波形のみを検出することができる。

【００１１】なお、当該電気測定器が電力計である場合、上記レベル値Ａ，Ｂには実効値が採用される。本発明は、電力計以外の例えばレコーダやオシロスコープな

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どの波形測定装置にも適用可能である。

【００１２】

【発明の実施の形態】次に、本発明を実施例により説明する。この実施例は電力計についてのもので、図１には大幅に簡素化されたブロック図が示されている。

【００１３】入力端子１には、例えばスーパーストアなどにおいて図示しない電圧計により測定された商用電源の電圧信号が入力される。その電圧信号は、Ａ／Ｄ変換器２により所定のサンプリング間隔でディジタル信号（電圧データ）に変換され、次段のマイコン（もしくはＣＰＵ）３に与えられる。

【００１４】マイコン３は、電圧データからその実効値などを演算するほかに、電圧データと、図示しない別の入力系統から入力された電流データとから、有効電力や無効電力および位相角などを算出する機能を備え、その測定値をディスプレイなどの表示器５に表示する。

【００１５】また、マイコン３は判定機能を備えている。すなわち、マイコン３は操作部４から入力された判定基準値と被測定信号とを比較し、異常があるかどうかを判定し、その判定結果を表示器５に表示する。

【００１６】本発明によると、波形判定は次のようにして行なわれる。図２のフローチャートに示されているように、まず、基準波形により判定エリアを作成する（ステップＳＴ１）。基準波形として、例えば５０Ｈｚ，１００Ｖの安定している電圧波形をＡ／Ｄ変換器２により所定のサンプリング間隔でディジタル変換して、１周期分の電圧データを得る。

【００１７】マイコン３に対して、あらかじめ操作部４から判定基準値が例えばレンジの±５％もしくは±５Ｖなどとして入力されているものとすると、マイコン３はその１周期分の各電圧データについて、その許容最大値と許容最小値を求め、その判定エリアＪ１をメモリに記憶する。また、マイコン３は各電圧データから、基準波形のレベル（この場合、実効値）を演算し、これについても同じくメモリに記憶する（ステップＳＴ２）。ここでは、基準波形の実効値をＡとする。

【００１８】次に、被測定電圧波形を取り込み、基準波形のときと同様に、Ａ／Ｄ変換器２により所定のサンプリング間隔でディジタル変換して、１周期分の被測定電圧データを得る（ステップＳＴ３）。マイコン３は、この各被測定電圧データもメモリに記憶するとともに、この各被測定電圧データから被測定電圧波形のレベル（実効値）を演算する（ステップＳＴ４）。

【００１９】この被測定電圧波形の実効値をＢとすると、マイコン３は、先に設定した判定エリアＪ１の許容最大値と許容最小値を被測定電圧波形の実効値Ｂに合わせて変更する（ステップＳＴ５）。これが実際の判定に供される判定エリアＪ２である。この判定エリアＪ２は、判定エリアＪ１の許容最大値と許容最小値を例えばＢ／Ａ倍することにより得られる。

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【００２０】理解を容易にするため、図３に被測定電圧波形の実効値Ｂが基準波形の実効値Ａよりも大きい場合に変更された判定エリアＪ２の例を示し、図４に被測定電圧波形の実効値Ｂが基準波形の実効値Ａよりも小さい場合に変更された判定エリアＪ２の例を示す。なお図中、Ｕは許容最大値で、Ｌは許容最小値である。

【００２１】このようにして、判定エリアＪ２を作成した後、この判定エリアＪ２により被測定電圧波形Ｖの判定が行なわれる（ステップＳＴ６）。すなわち、メモリから１周期分の被測定電圧データが読み出され、その各被測定電圧データが判定エリアＪ２の範囲内にあるかの判定がなされ（ステップＳＴ７）、被測定電圧データの一つでも判定エリアＪ２の範囲外であれば、ＮＯとして表示器５に「波形異常」を表示する（ステップＳＴ８）。

【００２２】すべての被測定電圧データが判定エリアＪ２の範囲内であれば、波形正常としてステップＳＴ３に戻り、被測定電圧波形の１周期ごとにステップＳＴ３からステップＳＴ７までを繰り返す。なお、ステップＳＴ７でＮＯ判定の場合、ステップＳＴ８で「波形異常」を表示した後、測定を終了させるか、ステップＳＴ３に戻って測定を続行するかは任意である。また、判定終了済みの被測定電圧データをメモリに保存するかどうかも任意である。

【００２３】

【発明の効果】以上説明したように、本発明によれば、基準波形のレベル値Ａと被測定信号のレベル値Ｂとの比率に応じて、判定エリアの幅を変更するようにしたことにより、被測定信号のレベル変動に関係なく、インパルスや高調波の重畳などによる本来求めるべき異常波形のみを検出することができる。

【図面の簡単な説明】

【図１】本発明を電力計に適用した実施例の概略的なブロック図。

【図２】本発明の波形判定方法を説明するためのフローチャート。

【図３】本発明により変更された判定エリアを示した波形図。

【図４】本発明により変更された判定エリアを示した別の波形図。

【図５】一般的な波形判定エリアを説明するための波形図。

【図６】波形判定エリアにより突発的な異常波形の検出状態を説明するための波形図。

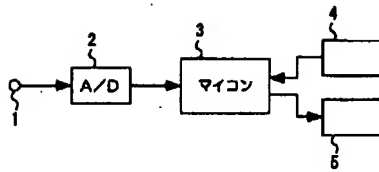【図７】波形判定エリアとの関係で、レベル変動により異常波形として検出される例を示した波形図。
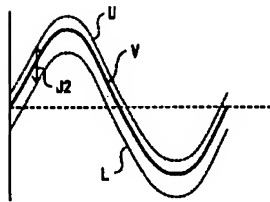
【符号の説明】

1　　入力端子

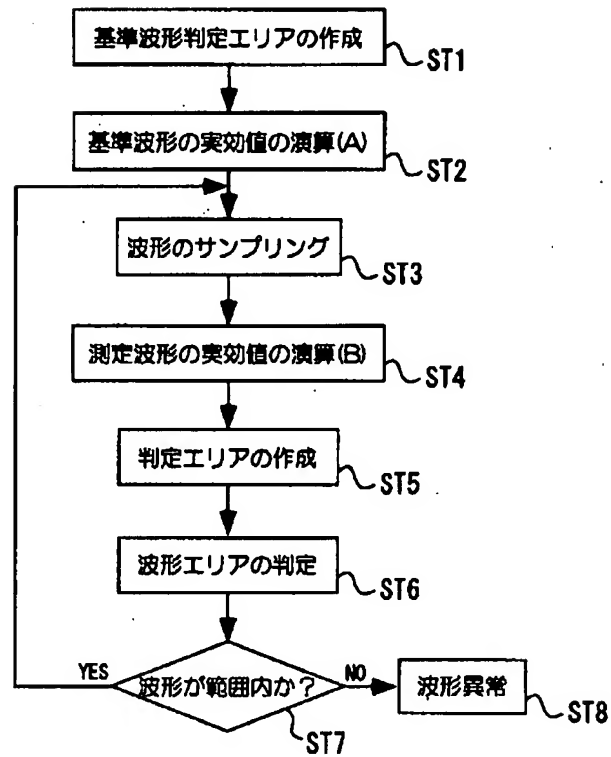2　　Ａ／Ｄ変換器

3　　マイコン

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4 操作部
5 表示器

J2 変更された判定エリア
V 被測定電圧波形

【図1】

【図2】

基準波形判定エリアの作成 ST1

基準波形の実効値の演算(A) ST2

波形のサンプリング ST3

測定波形の実効値の演算(B) ST4

判定エリアの作成 ST5

波形エリアの判定 ST6

YES 波形が範囲内か？ NO ST7

波形異常 ST8
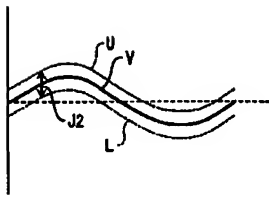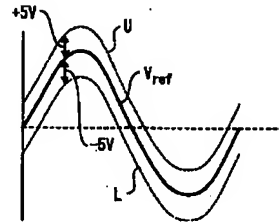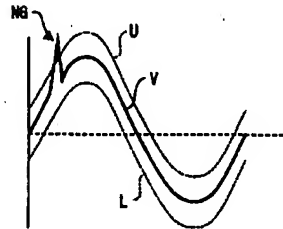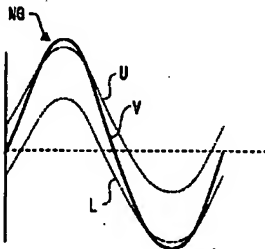
【図3】

【図4】

【図5】

【図6】

【図7】

PATENT ABSTRACTS OF JAPAN

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|	
(21)Application number : 11-340029	(71)Applicant : HIOKI EE CORP
(22)Date of filing : 30.11.1999	(72)Inventor : KUBOTA KUNIHISA

(54) METHOD OF DETERMINING WAVEFORM FOR ELECTRIC MEASURING INSTRUMENT

(57)Abstract:

PROBLEM TO BE SOLVED: To detect only an abnormal waveform caused by superposition and the like of an inpulse and a higher harmonic to be found essentially, irrespective of level fluctuation of measured signals.
SOLUTION: A width of a determination area is changed in response to a ratio of a level value A of a reference waveform to a level value B of the measured signal, in a waveform determining method for an electric measuring instrument which includes an A/D converter for sampling the measured signals at prescribed time interval, and a measurement control means for conducting various kinds of operations based on digital signals thereof to find measured values of the measured signals, and of which the measurement control means sets a prescribed width of determination area (the maximum allowance value and the minimum allowance value) in each sampling as to at least one cycle of the reference waveform taken preliminarily in to conduct prescribed determination by comparing each sampling data of the measured signal with the determination area.
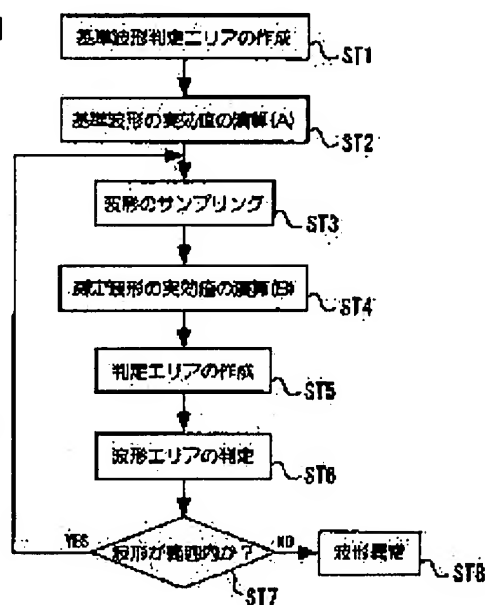
LEGAL STATUS

[Date of request for examination]   02.10.2006

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The A/D converter which samples a measurement signal-ed with a predetermined time interval, and a gauge control means for the digital signal to perform various operations and to calculate the measured value of the above-mentioned measurement signal-ed are included. The above-mentioned gauge control means about a part for at least 1 period of the reference waveform incorporated beforehand In the wave judging approach of an electrical measuring instrument of setting up the judgment area (allowance maximum and allowance minimum value) of predetermined width of face for that the sampling of every, comparing each sampling data and the above-mentioned judgment area of the above-mentioned measurement signal-ed, and performing a predetermined judgment In case the above-mentioned gauge control means sets up the above-mentioned judgment area from the above-mentioned reference waveform, it calculates the level value A of the above-mentioned reference waveform, stores in memory, and in measurement of the above-mentioned measurement signal-ed While calculating the level value B of a **** measurement signal by the operation for every period of the The wave judging approach of the electrical measuring instrument characterized by changing the width of face of the above-mentioned judgment area according to the ratio of this level value B and the above-mentioned level value A, and performing the wave judging of the above-mentioned measurement signal-ed by this changed judgment area.
[Claim 2] The wave judging approach of an electrical measuring instrument according to claim 1 that the electrical measuring instrument concerned is a wattmeter and both the above-mentioned level values A and B are actual value.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] If it says in more detail about the wave judging approach of an electrical measuring instrument, this invention does not answer the level variation of a measurement signal-ed, but relates to the wave judging approach of having enabled it to detect the burst phenomenon which originates in superposition of a higher harmonic etc. chiefly.
[0002]
[Description of the Prior Art] For example, when observing a voltage waveform over a long time, in order to make easy at the event of when abnormalities occurred, and analysis, he sets up the upper limit U and lower limit L for the judgment, and is trying to supervise a measured electrical potential difference by making this into judgment area from the reference voltage wave Vref used as the criteria of a wave judging in the former, as shown in drawing 5 .
[0003] Although this judgment area is suitably set up as **5V piece of the **5% width of face or the reference voltage wave Vref of a measurement range etc., a upper limit U and a lower limit L are memorized anyway by the memory of a microcomputer (an abbreviated name, microcomputer) for every sample takeoff point of that about a part for 1 of the reference voltage wave Vref period.
[0004] On the occasion of measurement, a microcomputer reads a upper limit U and a lower limit L from memory, and it supervises whether the part of judgment area out of range is in a measured voltage waveform by the comparator ability, and when the part outside the judgment area range is in the measured voltage waveform V as illustrated by drawing 6 , it judges with NG (abnormalities).
[0005]
[Problem(s) to be Solved by the Invention] according to this, when the burst wave of the shape of a mustache like drawing 6 appears by the impulse-noise, superposition of a higher harmonic, etc. in the measured voltage waveform V, it is shown in drawing 7 from the first -- as -- level variation -- a part of measured voltage waveform V -- judgment area -- also when it becomes out of range, it will consider as NG judging.
[0006] In the case of a source power supply, the level variation of the measured voltage waveform V is strongly influenced of a time zone. As an example, at a superstore, a convenience store, etc., although it is [the 100V neighborhood] stable in night, for example, at the time of full [of each facility of air-conditioning equipment, a food regrigerating facility, besides lighting facilities, etc., etc.] movable, there is a thing with little [on the whole] power consumption which an electrical potential difference falls even to the 97 - 98V neighborhood.
[0007] Although there was a case where he wanted to detect as abnormalities only the case where supervised the wave with such level variation and a wave-like form collapses truly by the impulse, superposition of a higher harmonic, etc., since level variation was also detected, with the above-mentioned conventional technique, the abnormal wave form phenomenon which should be detected essentially might be taken and spilt.
[0008]

[Means for Solving the Problem] This invention was made in order to solve such a technical problem, and the object is in offering the wave judging approach of an electrical measuring instrument of having enabled it to detect only the abnormalities in a wave by the impulse, superposition of a higher harmonic, etc., regardless of wave-like level variation.

[0009] The A/D converter with which this invention samples a measurement signal-ed with a predetermined time interval in order to attain the above-mentioned object, A gauge control means for the digital signal to perform various operations and to calculate the measured value of the above-mentioned measurement signal-ed is included. The above-mentioned gauge control means About a part for at least 1 period of the reference waveform incorporated beforehand, the judgment area (allowance maximum and allowance minimum value) of predetermined width of face is set up for that the sampling of every. In the wave judging approach of an electrical measuring instrument of comparing each sampling data and the above-mentioned judgment area of the above-mentioned measurement signal-ed, and performing a predetermined judgment the above-mentioned gauge control means In case the above-mentioned judgment area is set up from the above-mentioned reference waveform, calculate the level value A of the above-mentioned reference waveform, store in memory, and in measurement of the above-mentioned measurement signal-ed While calculating the level value B of a **** measurement signal by the operation for every period of that, according to the ratio of this level value B and the above-mentioned level value A, the width of face of the above-mentioned judgment area is changed, and it is characterized by performing the wave judging of the above-mentioned measurement signal-ed by this changed judgment area.

[0010] Thus, since the width of face of judgment area is changed, regardless of the level variation of a measurement signal-ed, only the abnormal wave form for which it should ask essentially is detectable according to this invention, with the ratio of the level value A of a reference waveform, and the level value B of a measurement signal-ed.

[0011] In addition, actual value is adopted as the above-mentioned level values A and B when the electrical measuring instrument concerned is a wattmeter. This invention is applicable also to wave measuring devices, such as oscilloscopes other than a wattmeter (for example, a recorder).

[0012]

[Embodiment of the Invention] Next, an example explains this invention. This example is a thing about a wattmeter and the block diagram simplified substantially is shown in drawing 1 .

[0013] The voltage signal of the source power supply measured by the voltmeter which is not illustrated at a superstore etc. is inputted into an input terminal 1. The voltage signal is changed into a digital signal (electrical-potential-difference data) by A/D converter 2 with a predetermined sampling period, and is given to the microcomputer (or CPU) 3 of the next step.

[0014] From the current data inputted from another input system which is not illustrated with electrical-potential-difference data except that the actual value etc. is calculated from electrical-potential-difference data, a microcomputer 3 is equipped with the function which computes effective power, reactive power, a phase angle, etc., and displays the measured value on the drops 5, such as a display.

[0015] Moreover, the microcomputer 3 is equipped with the judgment function. That is, a microcomputer 3 compares the criterion value and the measurement signal-ed which were inputted from the control unit 4, judges whether it is abnormal, and displays the judgment result on a drop 5.

[0016] According to this invention, a wave judging is performed as follows. Judgment area is first created by the reference waveform as shown in the flow chart of drawing 2 (step ST 1). As a reference waveform, digital conversion of the voltage waveform 50Hz and 100V are stable is carried out with a predetermined sampling period with A/D converter 2, and the electrical-potential-difference data for one period are obtained.

[0017] If the criterion value shall be beforehand inputted from the control unit 4 as **5% of a range, **5V, etc. to a microcomputer 3, about each electrical-potential-difference data for the one period, a microcomputer 3 will calculate the allowance maximum and allowance minimum value, and will memorize the judgment area J1 in memory. Moreover, from each electrical-potential-difference data, a microcomputer 3 calculates the level (actual value in this case) of a reference waveform, and, similarly

memorizes it in memory about this (step ST 2). Here, actual value of a reference waveform is set to A.
[0018] Next, a measured voltage waveform is incorporated, like the time of a reference waveform, digital conversion is carried out with a predetermined sampling period with A/D converter 2, and the measured electrical-potential-difference data for one period are obtained (step ST 3). A microcomputer 3 calculates the level (actual value) of a measured voltage waveform from each of this ****** electrical-potential-difference data while also memorizing each of this ****** electrical-potential-difference data in memory (step ST 4).
[0019] If actual value of this measured voltage waveform is set to B, a microcomputer 3 will change the allowance maximum and the allowance minimum value of the judgment area J1 which were set up previously according to the actual value B of a measured voltage waveform (step ST 5). This is the judgment area J2 with which a actual judgment is presented. This judgment area J2 is obtained by doubling the allowance maximum and the allowance minimum value of the judgment area J1 B/A, for example.
[0020] In order to make an understanding easy, the example of the judgment area J2 where the actual value B of a measured voltage waveform was changed into drawing 3 when larger than the actual value A of a reference waveform is shown, and the example of the judgment area J2 where the actual value B of a measured voltage waveform was changed into drawing 4 when smaller than the actual value A of a reference waveform is shown. In addition, U is allowance maximum among drawing and L is the allowance minimum value.
[0021] Thus, after creating the judgment area J2, the judgment of the measured voltage waveform V is performed by this judgment area J2 (step ST 6). That is, reading appearance of the measured electrical-potential-difference data for one period is carried out from memory, the judgment of whether each of that ****** electrical-potential-difference data is within the limits of the judgment area J2 is made (step ST 7), and if the judgment area J2 is out of range, one "at least the abnormality in a wave" of measured electrical-potential-difference data will be displayed on a drop 5 as NO (step ST 8).
[0022] If all measured electrical-potential-difference data are within the limits of the judgment area J2, from the step ST 3 to the step ST 7 will be repeated for every period of return and a measured voltage waveform to a step ST 3 as wave normal. In addition, after displaying "the abnormalities in a wave" at a step ST 8 by the step ST 7 in NO judging, it is arbitrary whether measurement is terminated or it returns to a step ST 3 and measurement is continued. Moreover, it is arbitrary whether measured electrical-potential-difference data [finishing / judgment termination] are saved in memory.
[0023]
[Effect of the Invention] As explained above, according to the ratio of the level value A of a reference waveform, and the level value B of a measurement signal-ed, only the abnormal wave form by the impulse, superposition of a higher harmonic, etc. for which it should ask essentially is detectable according to this invention regardless of the level variation of a measurement signal-ed by having changed the width of face of judgment area.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] If it says in more detail about the wave judging approach of an electrical measuring instrument, this invention does not answer the level variation of a measurement signal-ed, but relates to the wave judging approach of having enabled it to detect the burst phenomenon which originates in superposition of a higher harmonic etc. chiefly.

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PRIOR ART

[Description of the Prior Art] For example, when observing a voltage waveform over a long time, in order to make easy at the event of when abnormalities occurred, and analysis, he sets up the upper limit U and lower limit L for the judgment, and is trying to supervise a measured electrical potential difference by making this into judgment area from the reference voltage wave Vref used as the criteria of a wave judging in the former, as shown in drawing 5 .
[0003] Although this judgment area is suitably set up as **5V piece of the **5% width of face or the reference voltage wave Vref of a measurement range etc., a upper limit U and a lower limit L are memorized anyway by the memory of a microcomputer (an abbreviated name, microcomputer) for every sample takeoff point of that about a part for 1 of the reference voltage wave Vref period.
[0004] On the occasion of measurement, a microcomputer reads a upper limit U and a lower limit L from memory, and it supervises whether the part of judgment area out of range is in a measured voltage waveform by the comparator ability, and when the part outside the judgment area range is in the measured voltage waveform V as illustrated by drawing 6 , it judges with NG (abnormalities).

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, according to the ratio of the level value A of a reference waveform, and the level value B of a measurement signal-ed, only the abnormal wave form by the impulse, superposition of a higher harmonic, etc. for which it should ask essentially is detectable according to this invention regardless of the level variation of a measurement signal-ed by having changed the width of face of judgment area.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] according to this, when the burst wave of the shape of a mustache like drawing 6 appears by the impulse-noise, superposition of a higher harmonic, etc. in the measured voltage waveform V, it is shown in drawing 7 from the first -- as -- level variation -- a part of measured voltage waveform V -- judgment area -- also when it becomes out of range, it will consider as NG judging.
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MEANS

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The rough block diagram of the example which applied this invention to the wattmeter.
[Drawing 2] The flow chart for explaining the wave judging approach of this invention.
[Drawing 3] The wave form chart having shown the judgment area changed by this invention.
[Drawing 4] Another wave form chart having shown the judgment area changed by this invention.
[Drawing 5] The wave form chart for explaining general wave judging area.
[Drawing 6] A wave form chart for wave judging area to explain the detection condition of a sudden abnormal wave form.
[Drawing 7] The wave form chart having shown the example detected as an abnormal wave form by level variation with relation with wave judging area.
[Description of Notations]
1 Input Terminal
2 A/D Converter
3 Microcomputer
4 Control Unit
5 Drop
J2 Changed judgment area
V Measured voltage waveform

[Translation done.]